SCIENCE

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MEMORIAL ON THE FOUNDATION OF AN INTERNATIONAL CHEMICAL INSTITUTE[1]

GENERAL

THE recent foundation with such exceptional rapidity and unanimity of the International Association of Chemic Societies shows that chemistry, as a science, has advanced to a position where unregulated individual efforts are no longer sufficient and must be replaced by organizing the efforts of all chemists.

The participants in that formative meeting held in Paris toward the end of April, 1911, had not given the subject much previous thought, nevertheless even in this preliminary discussion a large number of undertakings of general interest were mentioned which showed how keenly the need of organizing all chemic activities is felt.

Such possible and necessary undertakings of general value discussed in the proceedings are:

1. The uniformity of nomenclature of chemic substances.

2. The inclusion of the international committee of atomic weights in the Association of Chemic Societies.

3. Uniformity in the nomenclature of physic and chemic constants.

4. Conformity in the editing of tables of contents of chemic publications.

5. A standardization of the writing of abstracts and other reviews of the new publications in chemistry.

6. The preparation of an international auxiliary language for publications of universal interest.

7. Standardization of the size of publications.

8. Arrangements for limiting the printing of an article in different publications.

9. Preparation of a chemic thesaurus in which

[1] Translated by Adolf Law Voge.

the gist of all chemic knowledge will be presented in a clear and trustworthy manner.

If one compares this abundance of new problems to which a little thought would add many more, with the means at the disposal of the International Association of Chemic Societies, one perceives the great disparity between them.

Many of the undertakings suggested require for their execution an institute at some fixed place, in which the requisite accessories, primarily a permanent and exhaustive library of chemical literature, are at hand; and where the methods of executing these new and difficult tasks can receive systematic test and improvement. Besides the organization of the scientifically trained chemists of the world, which has been practically accomplished by the International Association of Chemical Societies, it seems absolutely necessary to consider the creation of an establishment to perform the tasks set by this general body.

Immediately after the adjournment of the Association in the first days of May, I undertook as a task logically resulting from the formation of the Association, to consider providing for that permanent work-place, and endeavored by means of a provisional plan of organization to discover whether and in what way this great new problem could be solved. Since I was almost immediately fortunate enough to discuss them at length with Ernest Solvay in Brussels, these plans gained greatly in clearness, and, I believe, in possibility for realization. This successful organizer at that time expressed himself as ready, if the arrangements decided upon met with his approval, to contribute toward the founding of the Institute, a quarter million francs ($50,000). Unfortunately because of the pressure of his various business interests he felt it necessary to decline the permanent directorship of such an institute, which at first there was a prospect of his assuming.

AN INTERNATIONAL INSTITUTE OF CHEMISTRY

I considered my plan further, and attempted by means of a number of different sketches for its organization to form a clear idea of the various possibilities.

The proposal here presented is the result of those considerations; and is merely intended at present to show the feasibility of the new project! Naturally, all sorts of impracticabilities will become incorporated in such a new conception. These will be recognized and remedied as the institute expands and evolves. However, even now we can form a general idea of the operation of such an international institute. Such an institute seems to me so appropriate and desirable, that I feel the time is come to transform thoughts into action. Chemic science should be provided as soon as possible with the exceptionally versatile and far-reaching aid which would come from such an institution.

TASKS OF THE INSTITUTE

To guard at the very beginning against possible misunderstanding it should be emphasized that the proposed International Institute of Chemistry is to be in a certain sense a complement to the institutes for scientific investigation which were founded on the occasion of the centennial of the University of Berlin. Not in the highest spheres of creative scientific work are to be the labors of the International Institute of Chemistry; on the contrary those tasks in the realm of chemical science which are ever recurring in the same form are to be carried out there once for all, and placed at the service of every one; especially the literary reference work and everything connected with it; that is, the most trivial and routine labors which are necessary for the advancement of the science. Consequently in the future it should be a fundamental

principle in our science that no task of this kind once carried out need ever be repeated, for the finished work should be kept continually and regularly at the disposal of those whom it concerns.

In other words the International Institute of Chemistry is to have a function similar to that exercised by the Reichsanstalt of Technology in the revision and correction of thermometers, voltmeters and other instruments. Formerly the correction of a thermometer or other measuring instrument was the work of many weeks, now it is done by the Reichsanstalt in a very short time, and with far greater accuracy than is possible to an isolated physicist.

In chemistry to-day, likewise, there are a large number of tasks which must be done over and over again by the individual, because what has once been performed is not always accessible to the public. Just as the Reichsanstalt of Technology can make the correction of thermometers much more certainly and reliably than the average physicist could (without a disproportionate expenditure of energy) because this mechanical work is done regularly and systematically at the central bureau so these eternally recurring chemic tasks could be incomparably better and more accurately carried out at a central bureau than by the average inexperienced chemist. And if the regret is voiced, as it has been to me, that the useful art of making effective collections of literature would be entirely lost through the founding of an international institute of chemistry, the answer is that the loss of the art would mean no actual loss at all. For once the International Institute of Chemistry is founded it will furnish a permanent and perpetual organ of the whole science, which will perform its special functions far better than isolated chemists have performed them, and which will therefore make this sort of skill in the individual absolutely superfluous.

In a certain stage of its development the human embryo has gills, inherited from its aquatic ancestors. No one laments the fact that these gills never develop. For the conditions of man's life have become such that those organs would never be used. So the existence of the International Institute of Chemistry will alter working conditions for the future chemist so that he will not need to acquire skill in the sort of work which can be done by the Institute far better, and it would be a waste of time and energy for him to try to acquire these obsolete functions. The more the individual chemist can be emancipated from such mechanical tasks which give a disproportionate amount of trouble because of their infrequency, the more time and energy he will have for the real investigation which depends on his special training.

THE ORGANIZATION OF THE SCIENCE

A process is going on in chemistry which we have often observed in other phases of civilization. A hundred years ago the housewife was obliged not only to make bread, but to dip candles and boil soap. To-day these duties have been taken from her by special manufactories, and she has leisure to devote herself with greater zeal and success to her duties in the domain of the rearing of children. In just the same way a division of labor is taking place in all other fields. Man is constantly becoming more and more a creature working only with his brains, who leaves mechanical or partially mechanical operations to machinery. It need not be further emphasized that by such systematic cooperation, by the development of highly developed organs, infinitely more can be accomplished than under the earlier conditions of haphazard individual work. In the history of chemistry we certainly can find instances where extremely difficult compilations were carried on at first by one man,

who with the growth of the work was obliged to surrender it for completion to a group of men. It is true that during the second half of his life Berzelius prepared the Jahresbericht; but in his later years it was clearly seen how impossible it was for a single investigator to retain the power of passing appropriate and unprejudiced judgment on all contemporary works. The Jahresbericht in so far as it still exists has long been the product of the cooperation of a specially trained group of men.

In precisely the same way the Index of Organic Chemistry was created by the indefatigable Beilstein, but to-day there is no scientist of equal caliber who can carry on this enormous work in the same spirit and with the same reliability. Here it has been necessary to intrust the continuation of the work of a single man to a whole staff.

All these instances show most clearly the need of an international general organization of chemic undertakings of this kind. The work done, for example, by the commission in preparing the supplement to the Beilstein Index is of benefit not only to the German chemists but to the chemists of the whole world, and should therefore be done not by a German, but by an international institute. The same holds true of all other general undertakings in chemistry; for chemistry, like every other science, is entirely independent of national peculiarities.

NEW FUNCTIONS AND ORGANS

It must not be forgotten, either, that the capacities which enable a man to prepare an ideal abstract or an ideal review are not those which distinguish the investigator and discoverer. The maturity of an organism is shown most clearly by its differentiation of function. This differentiation of function has no other purpose than the bringing about of greater efficiency through specially adapted organs. So too in the future International Institute of Chemistry, a special technique of collecting and abstracting will be evolved which will bring about far greater speed, completeness and reliability than appears possible with our hitherto somewhat haphazard methods.

We appreciate too, that this wearing and severe work of abstracting is almost always done by young men, who work only a few years, not with any idea of making it a profession—merely for the sake of eking out their incomes. As soon as the young man obtains a better position he renounces this work. Therefore proficiency in this work must continually be attained anew, so that no high degree of excellence is ever reached. But so soon as this kind of work is undertaken by specially fitted people as a life work, it will not only be incomparably better done, but there will be an ever higher standard of excellence in the individual production. Present-day abstracts, for example, leave a great deal to be desired, as every one knows who has been obliged to use them, because a scientific treatment of the question of what belongs in an abstract and what can be left out has actually never yet appeared. The individual abstractor is thrown on his own sense of fitness and such instructions as are vouchsafed him by the director when his errors are too flagrant. In the case of lifelong occupation with such problems, the technique of abstracting will be developed to a real science, and the workers whose scientific ambition is concentrated on this problem will be able to write abstracts which could actually supplant the original, because one could find in them with certainty the essential points of the original article. Such a technique is the more necessary because it has long been impossible

for the individual to keep pace with the progress of his science. He is dependent on abstracts, and moreover on their appearing with great promptness, if he would not lose his survey of the entire work of his field. So the work of abstracting to be organized in the International Institute of Chemistry will not only make the older literature specially accessible, but will satisfy this daily more pressing need in giving the investigator an exhaustive survey of his special problems, a survey which can reach according to requirements from the earliest times to the present. Any one who for scientific or economic reasons wishes to follow the progress of any special problem can be assured if he makes use of the Institute, that nothing of importance will escape his notice; but at present it is physically and financially impossible for an individual to have instant recourse to the existing literature of a subject.

NEW MEANS OF PUBLICATIONS

Since the present means of publication, the periodicals, yearly reviews, the monthly or quarterly compilation, the Zentralblatt, have shown themselves increasingly insufficient to the increasingly complex and urgent demands of science and technology, the developing science must create new organs of interpretation to make itself effective and can not delay till these organs are provided for it from without. As always with such innovations the need is seen much sooner than the means of satisfying it. There is no other way except for those men who have seen the need and discovered the means of its satisfaction, to produce those means even at considerable personal sacrifice. When the organ has begun its regular activity and shown its usefulness and indispensability, it will no longer be so difficult to obtain the necessary money for its support.

THE INTERNATIONAL INSTITUTE OF CHEMISTRY

The first thing then for us to do is to bring the International Institute of Chemistry so far into being that it can perform its real functions, and show clearly its advantages. Let that go on uninterruptedly for five to ten years, and it can safely be assumed that such an institution will show its public and general usefulness so plainly that public and general funds will be provided for its permanent maintenance.

On the other hand if it were premature or impracticable, time would show that too.

The benefits of such an institution would extend far beyond the circle of its own science, large as that circle is, thanks to the extraordinary development of chemistry in the last century.

But something similar to the systematization which is necessary in this special field is demanded by all other sciences and many other of the common interests of humanity. Because of the enormous facilitation of personal intercourse by trains and steamers and of intellectual intercourse by books, newspapers, letters, the telephone, the telegraph, the wireless telegraph, etc., mankind is concentrated into a much smaller space than formerly. The isolated groups, the nations, which were formerly separated by great distances, and possessed few interests in common, are suddenly forced into great interdependence, and the problem of organization, that is, the continual and regular connection of these groups of humanity is the most pressing problem of the time. Just as the science of chemistry will create in the International Institute its own organ for performance of tasks for the general good, so will similar organs be developed in the most various enterprises, and we chemists who originated the *Jahresbericht* as the first of its kind, will have the honor of doing pioneer service in this

field also—the organization of a whole science. It is true that many kinds of international scientific organizations will have preceded the International Institute of Chemistry. I need only mention the International Bureau of Weights and Measures in Sevres. But the work of independently organizing a whole science so that its mechanical functions will be completely taken away from the general public, may be called entirely new, and to those who perceive the necessity and practicability of such an organization and do their part toward its realization, will remain the incontestable honor of having done pioneer service in one of the most important departments of civilization of all humanity.

LOCATION OF THE INSTITUTE

We turn now to the question of the practical organization of such an institute.

It must be emphasized in the beginning that we are considering not a traveling, but a large permanent institute with numerous buildings, collections, laboratories, etc. The first question to be decided is that of the location. At first glance it seems a matter of indifference where it be placed, provided only certain general conditions be fulfilled. The institute must not be too far removed from some center of intercourse, that the necessary communication with the general public may be carried on without loss of time. We should agree that the institute must be located in Europe, because the greatest spacial density of chemical activity is in Europe, and the intercourse between the individual chemists and the institute could be carried on with the least possible loss of time. To be sure we recognize that a second center of gravity of chemic science and technology is to be found on the other side of the Atlantic Ocean in North America, and that the formation of a sister institution in America is essential. Such a sister institution would be specially advantageous because the work in common would be divided between the two institutes, and together they could cover the literature of the past in half the time. Meanwhile, for the reasons already given, it is Europe's duty and also her right to undertake the founding of the first institute, and to do the pioneer work in the execution of this plan. As regards the more exact situation of the institute, I have considered the neighborhood of Brussels, in the hope that Ernest Solvay would place his great talents as an organizer at the service of the institute. Since this hope can no longer be realized, the question of the location of the institute for the present is relegated to the background. The decision will depend largely upon where and how the funds for the institute are obtained.

DUTIES AND ARRANGEMENT OF THE INSTITUTE

On a suitable piece of ground of at least five hektares, in the vicinity of a great city, the buildings of The International Institute of Chemistry will be erected. Each department will be housed in a separate building, specially arranged and fitted out, but these buildings are to be so connected that the assistants can go from one to another without loss of time, and danger from exposure. So I planned to have the main building long and wide, built through the length of the grounds. From this, on either side, at suitable distances, will open the wings in which the departments of the institute are to be housed. The easy mode of communication between the wing buildings furnished by this corridor will be of primary importance in the operation of the institute.

I have considered the following departments, each of which will be housed in a separate wing.

CHEMICAL WORLD LIBRARY

A Library of the Entire Literature of Chemistry

I offer as a foundation for this library my private library of some 7,000 volumes and 12,000 pamphlets (dissertations). It contains the most important chemic and physic journals in complete or nearly complete series, as well as several thousand single volumes covering all fields of chemic science.

The expansion of this library which must have as its aim the possession of every book on any chemic subject, will take place partly through purchase, mainly through donations. Such gifts will often be made us by public-spirited chemists who many times are glad to get rid of duplicates, and books for which they have no use. Further, we anticipate that all chemists will give copies of their newly published work to the library, that publishers of periodicals, scientific societies and all other institutions, for the propagation of chemic literature, will place copies of their publications at the service of the institute free of cost. In this way the library can be maintained at a very slight cost. The presence of a new book in the library of the institute, instead of hindering its sale to private parties, will prove the best possible advertisement for publishers.

INDEX OF CHEMIC SUBSTANCES

This library will furnish the working material for two or three other departments.

First of all a card index of all chemicals will be prepared, according to the well-known principles of card-indexing. This will contain citations to all the literature on these substances. It will form automatically the foundation for a complete history of the study of chemical substances. This will do away with the necessity of those historic introductions with which chemic literature, particularly the dissertations, are so senselessly burdened, because every one will know that he can obtain a complete historic survey from the card catalogue of the institute. This department will furnish compilations of the entire literature on any chemic substance to any member of the institute, or any inquirer, for the cost of copying or gratis. How greatly this will facilitate scientific work will be appreciated by any one who has tried to collect the whole literature on some chemic subject. There is always the chance that something will be found of vital importance, which has been hitherto overlooked because there has been no systematic organization of all chemic literature.

INDEX OF TERMS

As a supplement to the card catalogue of chemic substances, there will be prepared a similar catalogue of all chemic terms. The terms, as well as the substances will first undergo a process of crystallization and purification. The history of the development of chemic terms is no less important than the history of the substances themselves.

INDEX OF PERSONS

The third and final collection will be an index of all chemists, dead as well as living. An exhaustive compilation will be made of the entire literature of each investigator who has taken or is taking part in the development of chemic science.

This will form automatically a directory of all chemists of the world who have published. Eventually it will be enlarged to embrace not only the chemists who have come in contact with printer's ink, but all who have in any way been connected with chemistry, pure or applied. The lists of members of all chemic societies, as they appear each year, will serve as foundation for this directory. So in the future it will be

possible for any chemist to communicate with any other chemist in the whole world.

THE ABSTRACTING DEPARTMENT

Chemists long ago realized how extremely uneconomically the abstracting of contemporary scientific literature is done. Not only is all chemic literature abstracted in German in the *Zentralblatt*, in English abstracted twice, once by the English and once by the American society, in French by the French societies, and in other languages, such as Italian and Russian, by their societies; there are in addition a large number of periodicals for special branches of chemistry which prepare quarterly, semi-annual or annual bibliographies in their own fields. It can be said without exaggeration, that every article is abstracted on the average from five to ten times, and this so necessary work is done with from five to ten times too great an expenditure of energy. And withal the individual abstracts, for the reasons already given, are always more or less incomplete. If carried on by a central bureau, with assistants all over the world, if necessary, this work would be done for a small fraction of the present expense and far more quickly and accurately.

I realize that it will be some time before the centralization takes place, for the present institutions will not vanish at a word. But even those who cherish a prejudice against such centralization can not deny that with the rapid increase of chemic literature the old organizations will sooner or later prove inadequate, and a central organization become a necessity. It is always better to recognize such necessities as early as possible, because the changes can more easily be introduced when the material is not yet too overwhelming than when up to our necks in the water of chemic literature.

CHEMIC REFERENCE AND TEXT-BOOKS

From the reference department will come eventually the material for the great encyclopedia of all chemistry. In this book everything done and being done in the fields of chemic science and technology will be systematically compiled. Such a work would necessarily be of so enormous a scope that its complete publication could not be considered for the present. But it will exist in the form of the systematically arranged references in the International Institute of Chemistry.

There will, of course, be a second copy in America. It will be possible for any one who has a special interest in any question to have compiled for him the entire reference material on this subject. The Institute will make special arrangements for the copying of single portions of the complete work, at nominal prices which need scarcely cover the actual cost, so that any chemist can have access to the part of this huge work covering his own field.

It need scarcely be mentioned that smaller reference and text-books can be compiled from the same material. The preparation of the literary structure of all chemic texts would be placed on a much higher scientific and technical basis than at present. Now each individual author must write work all over again which has been written many times before, or lay himself open to the charge of plagiarism.

INTERNATIONAL AUXILIARY LANGUAGE

There would also be various departments for the more complete utilization of the work done by the main institution. I would mention specially the bureau of translation which, if necessary, could be later developed into the bureau of an international auxiliary language. The great variety of chemic literature which appears in different languages is very imperfectly utilized

for the advancement of the science. Whatever is published in Russian or Roumanian or some other little-known language is read only by a comparatively small circle and a translation into some more familiar language is necessary to add such articles, sometimes of very great value, to our stores of knowledge. In a paper which appeared in January in the *Zeitschrift fuer physikalische Chemie*[2] I worked out an international chemic nomenclature, founded on the world language Ido. I showed that a chemic nomenclature in a plastic, artificial language is better, more consistent and more comprehensible than in any natural language. With the comparatively limited range of terms and conceptions used in a special science like chemistry, the formation of an artificial language is a comparatively easy task. The attempts at the construction of some such universal means of communication, which have been made with increasing zeal during the last forty years have undoubtedly shown its practicability. Such an artificial language is far better suited to our purposes than any natural language. These facts are not so well known as they deserve to be. They are none the less true and will be confirmed by well-known members of our science.

So it is possible for us to make the intellectual treasures of our science equally accessible to all the chemists of the world through a common language. We need only choose one of the artificial systems already at hand. Because Ido is the only one in which a systematic chemic nomenclature has been worked out, we should turn our attention first to that scientifically perfected idiom.

THE COLLECTION OF CHEMICALS

The departments already described cover the literary side of science. Provision must also be made for the experimental practical side in such an international institute. Here the first essential is a complete collection of all existing chemicals of absolute purity and reliability. Such a collection would be made not only for systematic and didactic reasons. The chemist who happened in his experimenting to prepare a substance possibly never prepared by him before, could secure samples from the institute for comparison. Further, such samples would be of service when a determination of any physical properties of the substances was to be made. Every one who has done such work knows that the most arduous part is the preparation of the materials for the experiment while the actual determination of the properties is comparatively easy and rapid. Instead of preparing the same substance in one laboratory for the determination of the refraction coefficients, in another laboratory for the magnetic rotation of the plane of polarized light, and in a third for its absorption of ultra-violet or ultra-red light and so on, the collections of the International Institute could be used everywhere for the determination of all possible properties. The objection has been raised to this plan that there are numerous substances which can not be kept indefinitely without deterioration, and could not therefore be used satisfactorily for such purposes. The answer to this objection is that naturally a laboratory would be connected with this department where new substances could be prepared and where fresh materials could be produced and the purity of substances which were to serve in standardizing operations could be tested.

It must again be emphasized that the aim is far less to undertake pioneer investigations than to rationally support enterprises already mentioned, with the means at the disposal of the institute. This is to be done according to the fundamental prin-

[2] Vol. 76, p. 1–20.

ciple that any sort of work which has once been satisfactorily performed is to be regarded as definitely finished for the whole science, and that such work be ever at the disposal of the entire science.

ROOMS FOR TRANSITORY WORKERS

Finally a special division of the institute must be mentioned, the necessity for which must often have occurred to any one who has attentively followed these considerations. It is the building in which simple rooms for the accommodation of transitory workers in the institute will be provided. The incomparable services which the institute would soon be in a position to render would not only offer opportunities to the regular assistants for pursuing their investigations, but would attract voluntary workers who wished to make use of the aids offered by the institute for their particular problems. The most liberal opportunities should be afforded them, for the institute is to stand at the service of the public.

Such people should be able to reside for a longer or a shorter time in the institute. The provision for them can be the simplest possible. A sufficiently large sleeping room with the necessary toilet arrangements is quite enough, for the work will be carried on in the different departments of the institute and the rooms need not be equipped for that purpose. Provision for serving meals should also be made so that the assistants can remain at the institute through the entire working day and obtain warm food when desired. This is an arrangement more advantageous to brain workers like those of the institute than it is to manual workers.

ORGANIZATION OF CHEMIC SCIENCE

Only the most important divisions have been mentioned, the development of which must be considered by the International Institute.

When these first, more important departments have become active, the other sides of the problem for the thorough organization of the institute must be taken up. Opportunity is afforded here for individual donors to endow parts of the work to which they are specially devoted.

This holds especially for the numerous and versatile fields of applied chemistry, which have not been mentioned in this paper. From this it is by no means to be inferred that they would be excluded from the institute. They have been omitted from the paper because the purely scientific field, being fundamental, must precede; and because the author is much less conversant with them than with pure science.

In the directing bodies of the International Institute (to be explained later) are to be representatives of applied chemistry and from their suggestions proper attention will be paid to these subjects.

In chemistry the pure and applied sciences are so happily affiliated that exemplary arrangements can be attained to more easily than in most other fields of applied science.

DIRECTION OF THE INSTITUTE

Again emphasizing the fact that the following is merely a suggestive plan evolved after long meditation and discussion, and is not at all to be regarded as a fixed unchangeable arrangement, I conceive of the International Chemical Institute being directed in the following way:

The higher direction of the institute will be entrusted to a triple presidency, one member of which will direct the scientific, another the economic and financial activities while the third will be the president of the International Association of Chemic Societies. The separation of the scientific

from the economic activity is a necessity. A distinguished president in one of these activities would scarcely prove an excellent one in the other; yet it is evident that both phases of the work must be executed with equal excellence. The need of the third member of the presiding body scarcely demands an explanation.

It is naturally necessary that there should be a close and carefully defined connection between the International Chemical Institute and the International Association of Chemical Societies. The International Chemical Institute is, so to speak, the executive for the widest needs of chemistry in general, as represented by the International Association of Chemic Societies. Through this constant connection of the Institute with the Association, joined to the annual change in the representative of the Association, a vivifying factor will be introduced in the Institute, so easily neglected when the management remains always the same.

To the president of scientific activities the directors of the different scientific departments will be subordinate. These directors will have independent control of their own sections. These latter should all be lifelong positions for which the most capable and experienced occupants must be found. Each departmental director will be served by a larger or smaller group of assistants according to the type of work of the department. Each of these departments must be operated efficiently and according to the most recent progress in technique—which goes without saying in an institute founded on truly scientific principles.

Further two more bodies could well be formed, standing in a freer relation to the institute. First, a scientific council which together with the president of the International Association of Chemic Societies will provide the Institute with requisite new suggestions, demands and methods. This will be an independent body formed of leaders in scientific and technical chemistry throughout the world. It will meet, say, annually for free discussion concerning the management and development of the Institute. Perhaps its function can be partly performed by the Council of the International Association of Chemic Societies.

A second similarly constituted body will be formed of those who have aided in founding and supporting the institute, through gifts of importance whether of money, materials, books, chemicals, etc. This body would support the president of finances as the other would the president of science and would act particularly when funds were to be secured, or the activity of the Institute expanded and new departments formed.

MEMBERSHIP OF THE INSTITUTE

Concerning the relation of the Institute to chemists the world over, I conceive of the following connection:

The extraordinary simplification and help which every one can obtain from the Institute for work in our field justifies a certain pecuniary support from those so aided. On the other hand it must be borne in mind that the majority of our colleagues are not in brilliant pecuniary positions so that this fee must be made relatively small. Yearly dues of one to two dollars could be borne by all whose work would be furthered by use of the institute and would be large enough to aid materially.

The membership of the chemic societies of the world is about 20,000; assuming that half of these became members of the Institute an annual fee of one dollar would yield a yearly income of ten thousand dollars; a two dollar fee yield twice as

much. That is a sum almost sufficient for the salaries of the staff, at first.

Unattainable in the first or second year, this membership should be reached in the fifth year of the Institute's existence; and after the first decennium the benefits of the Institute will have been so incontestably proven, that no chemist, whatever his activity, will find it practicable to carry out his work without using it. Then the annual membership fees would amount to much more than we have assumed.

CONDITIONS FOR THE FOUNDATION

The foundation of so great an institution is not possible on the uncertain basis of membership fees. A realization of the entire plan can only be expected when a definite sum of money has been assured for the first outlay, and a yearly income guaranteed for a number of years.

After repeated calculation of the requirements and conditions and with the feasible assumption that nothing need be allowed for the purchase of the land, I assume that with an endowment of $150,000 and an annuity of $12,000 for five or ten years, the Institute could be called into being without subjecting ourselves to the stigma of financial rashness.

Neither sum can be obtained except through the willing participation of those persons and institutions who would derive personal or public benefit from the International Chemical Institute or who wished to serve as public benefactors.

Personal solicitations will be instituted to obtain this endowment for the establishment of the International Chemical Institute.

The liberality of one or another country will eventually decide where in Europe the main institute is to be located.

Wilhelm Ostwald

THE MAN OF PILTDOWN

The story of the Piltdown discovery is already more or less familiar to readers of this journal.[1] But the recent gathering and publishing of additional data[2] on the subject should not be allowed to pass unnoticed. This is especially true not only because of the far-reaching significance of the discovery, but also because British scientists have been known to be at odds concerning the reconstruction of the skull in question.

It will be recalled that Dr. Smith Woodward regarded the Piltdown specimen as the type of a new genus of the family Hominidæ, to which he gave the name *Eoanthropus dawsoni*, and which was defined primarily by the characters of the mandible. Of the mandible only the right ramus with first and second molar teeth *in situ* was at first discovered. The condyle and symphysis were both lacking, but the fragment was of sufficient size to enable Dr. Smith Woodward to reconstruct the symphysis with a fair degree of accuracy. It was the reconstruction of the cranium about which differences of opinion arose between Dr. Smith Woodward and Professor Elliot Smith, on the one hand, and Professor Arthur Keith, on the other.

Of the brain case nine fragments, parts of the frontal, parietal, occipital and temporal, were found. From these Dr. Smith Woodward reconstructed a skull with a capacity of about 1,076 c.c. On the other hand, a reconstruction by Professor Keith gave to the skull a brain capacity of 1,500 c.c., in other words, that of a well-developed modern European skull. After further study Dr. Smith Woodward acknowledges a small error. He finds that the "longitudinal ridge along the outer face at the hinder end of the parietal region is not median, but one of a pair such as frequently occurs in the lower types of human crania." In the published reconstruction there should thus be a slight readjustment of the occipital

[1] Science, January 17, 1913.

[2] Chas. Dawson and A. Smith Woodward, "Supplementary Note on the Discovery of a Palæolithic Human Skull and Mandible at Piltdown (Sussex)," *Quar. Jour. Geol. Soc.*, LXX., April, 1914.